

# **Aquatic and Terrestrial Fauna Team 1997 to 2004**

## **Mission**

**Conduct research on the ecology, biology, and community structure and function of aquatic and terrestrial animals with emphasis on warmwater fishes, freshwater mussels, and Neotropical migratory birds.**



**Center for  
Bottomland  
Hardwoods  
Research**

**Forest Service Organic Administrative Act**  
**National Forest Management Act (NFMA)**  
**National Environmental Policy Act (NEPA)**  
**Endangered Species Act (ESA)**  
**Clean Water Act**  
**Migratory Bird Treaty Act**

**USFS Chief's Four Threats**  
**Fragmentation, Invasive Species,**  
**Dispersed Recreation, Fire**

**FishNet**  
**Partners in Flight (PIF)**  
**North American Bird Conservation Initiative**

**State Forest Best Management Practices (BMPs)**  
**State 'Comprehensive Wildlife Conservation Strategies'**  
**State Natural Heritage Initiatives**

**The Nature Conservancy Freshwater Initiative**  
**World Wildlife Fund Southern Aquatic Biodiversity**



# The 'Critter' Team is back!



**"OSHA my foot, no way I'm a wearin' shoes."**

Quote from anonymous Team Member



## **Dr. Susan B. Adams**

- **Joined SRS & CBHR 1999**
- **Ph.D. University of Montana**
- **Post-doc Flathead Lake Biol. Sta.**
- **Stream ecology**
- **Anadromous fish biology**
- **Mechanisms limiting non-native invasive fishes**





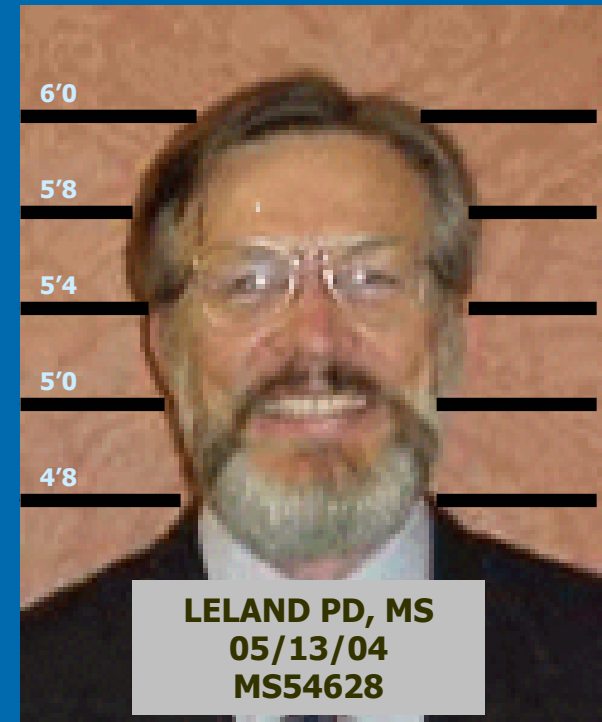
# Dr. Wendell R. Haag

- Joined SRS & CBHR 1993
- Ph.D. University of Mississippi
- Stream ecology
- Freshwater mussel biology
- Reproductive & population biology



# Dr. Paul B. Hamel

- Joined SRS & CBHR 1993
- Ph.D. Clemson University
- Avian & small mammal ecology
- Bird survey techniques
- Avian habitat relationships
- Wildlife & afforestation of agricultural lands







**Carl Smith**  
**Wildlife Biologist**



**Amy Commens**  
**Fishery Tech**



**Gordon McWhirter**  
**Hydrological Tech**



**Technical  
Staff**

**Gayle Henderson**  
**IT Specialist**



**Cliff Harwell**  
**Hydrological Tech**



# Research Emphasis Areas



**Aquatic  
Terrestrial  
Linkages**

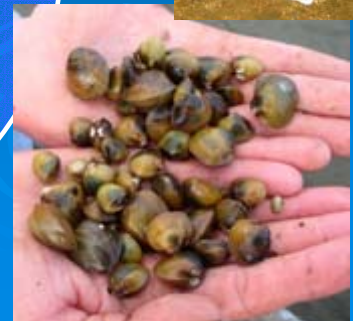
**Tools for  
Inventory  
Monitoring  
Assessment**

**Community  
ecology, land-  
use, &  
environment**

**Integrity of Forest  
Ecosystems**

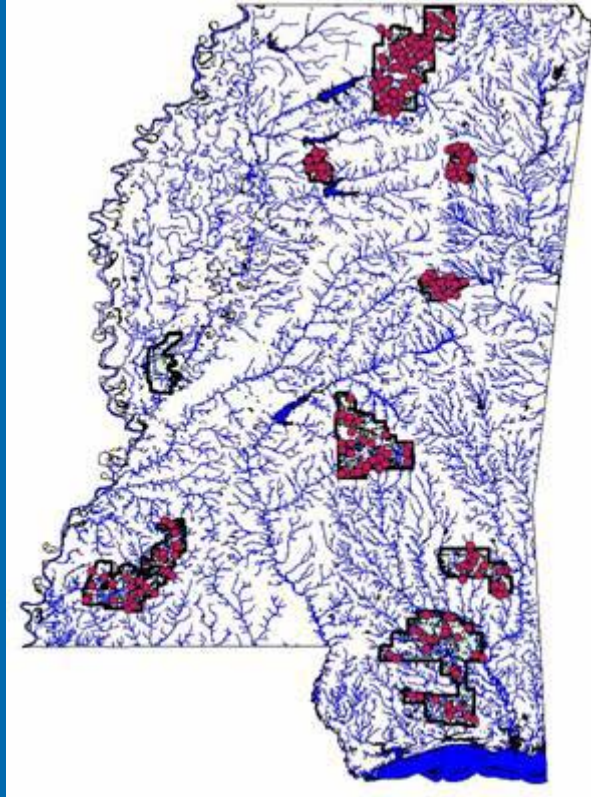
**Life History  
Distribution  
Autecology**

**Population Biology  
Dynamics  
Demography  
Growth Rates**





# Inventory, Monitoring, & Assessment: Tools for Managers



## MsNF Fish and Fish Habitat Survey

- First systematic, repeatable stream survey
- 1999-2004, 7-8 student employees
- 364 stream reaches, 7 ranger districts
- Habitat & fish abundance quantified
- 110 fish species, plus crayfish & mussels

## IMPACT

Forest-wide Planning  
**Geo-referenced  
Digital  
Database**

Inventory (ongoing)

Crayfishes of the MS (ongoing)



# National Forest Mussel Surveys

First watershed-wide quantitative surveys

- Globally significant bio-reserves (NFS, TNC)
  - Daniel Boone NF (2 systems)

Partners/Supporters

USFWS

Southern Region FS

Center for Aquatic Tech. Transfer (CATT)

Daniel Boone NF

The Nature Conservancy

Ky. State Nature Preserves Comm.

Ky. Division of Water

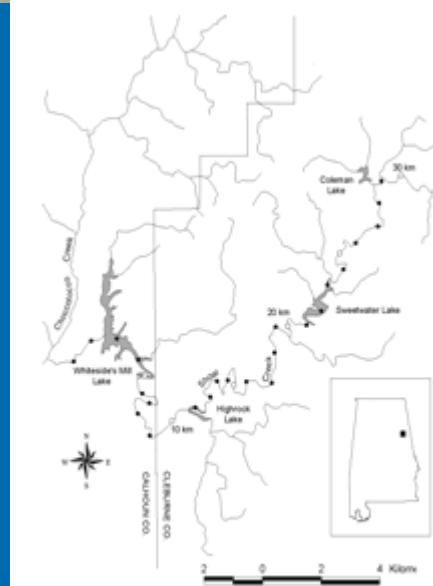
Eastern Kentucky University

populations

Interagency Recovery &

Rehabilitation Taskforce Formed

Peer-reviewed publications (on-going)





# Large-scale Assessments

## IMPACT

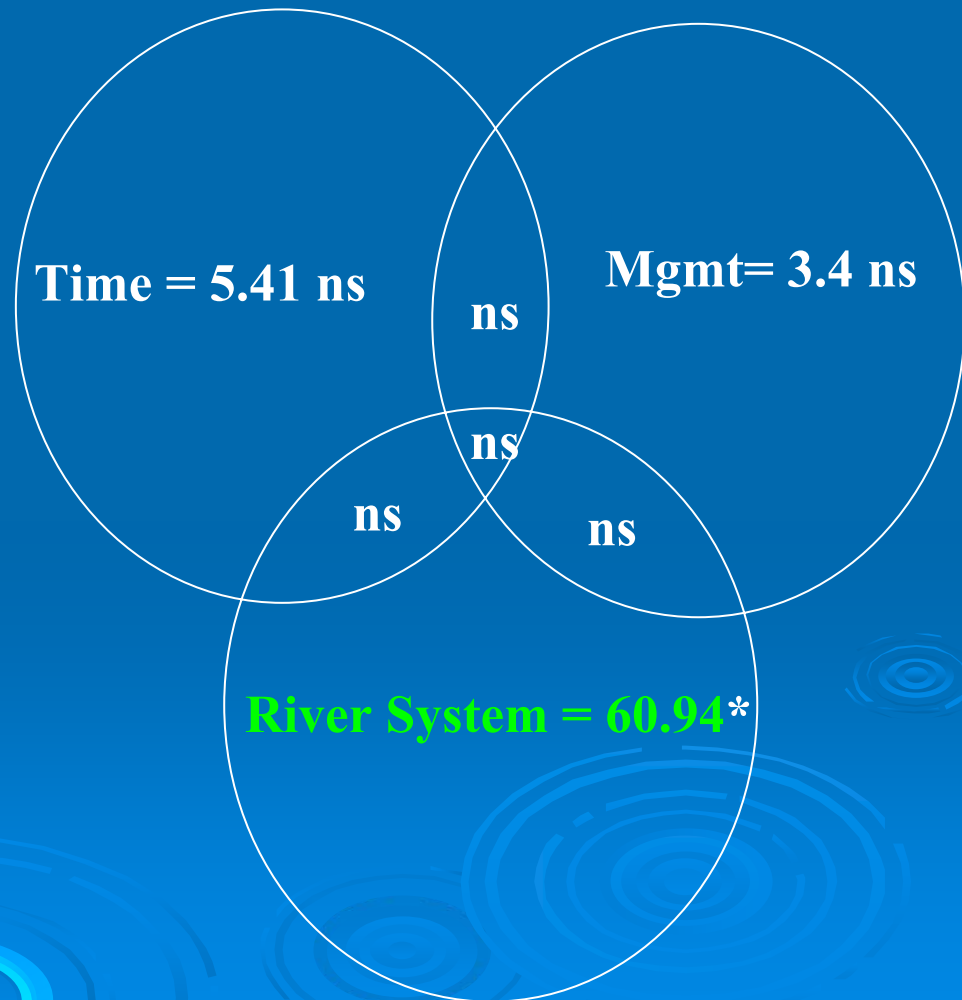
- Increased awareness of diversity, uniqueness
- Revision of Nature Conservancy Global Rankings
- NCASI RFP on endemic southern fishes
- Geo-referenced fish database for Arkansas
- Cerulean Warbler Technical Group
- El Grupo Ceruleo
- Information base for:
  - SRS Southern Forest Assessment
  - Tenn.-Cumberland Ecosystems at risk (USFWS)
  - Watershed condition/species risk analyses:
    - Southern NF Aquatic Assessment
    - Appalachian NF Plans
    - Ouachita, Boone, and MS NF Plans

# Community Ecology, Land-use, & Environment: Ouachita Mtn. Ecosystem Management Research

## Large-scale effects of timber harvest on stream communities

- 3 watershed pairs, extensive vs limited harvest histories, each pair in a different river systems
- No detectable large-scale effects from forest management for fish or invert communities
- Major differences were among river systems

## Fish Community





# Community Ecology, Land-use, & Environment: Ouachita Mountain Ecosystem Management Research

## Cooperators/Supporters

- Weyerhaeuser Corporation
- The Nature Conservancy
- Arkansas, Game and Fish, Natural Heritage
- Arkansas State University
- Mississippi State University
- Ohio State University
- University of Oklahoma
- University of Montana
- University of Wisconsin – Eau Claire
- Southern Arkansas University
- US Environmental Protection Agency

## Research Output

- 2 post-docs, 3 Dissertations, 1 Masters
- 11 peer-reviewed papers (national/international journals)
- 4 manuscripts undergoing peer-review
- 8 'in press' manuscripts SRS General Technical Report
- More to come!

### Effects of habitat isolation on the recovery of fish assemblages in experimentally defaunated stream pools in Arkansas

*Transactions of the American Fisheries Society* 127:637-644, 1998  
American Fisheries Society 1998

### Road Crossings as Barriers to Small-Stream Fish Movement

MELVIN L. WARREN, JR.\*

*Transactions of the American Fisheries Society* 132:126-138, 2003  
© Copyright by the American Fisheries Society 2003

### Influence of Fish Predation on Assemblage Structure of Macroinvertebrates in an Intermittent Stream

LANCE R. WILLIAMS\*<sup>1</sup> AND CHRISTOPHER M. TAYLOR

*Department of Biological Sciences,  
Mississippi State University,  
Mississippi State, Mississippi 39762, USA*

MELVIN L. WARREN, JR.

*Environmental Biology of Fishes* 67: 203-216, 2003.  
© 2003 Kluwer Academic Publishers. Printed in the Netherlands.

### Environmental variability, historical contingency, and the structure of regional fish and macroinvertebrate faunas in Ouachita Mountain stream systems

Lance R. Williams\*, Christopher M. Taylor\*, Melvin L. Warren, Jr.\* & J. Alan Clingenpeel<sup>†</sup>

*Ecology* 82(8): 2001, pp. 2320-2330  
© 2001 by the Ecological Society of America

### DYNAMICS IN SPECIES COMPOSITION OF STREAM FISH ASSEMBLAGES: ENVIRONMENTAL VARIABILITY AND NESTED SUBSETS

CHRISTOPHER M. TAYLOR<sup>1,2</sup> AND MELVIN L. WARREN, JR.<sup>2</sup>

### Effects of riffle length on the short-term movement of fishes among stream pools

D.G. Lonzarich, M.R. Lonzarich, and M.L. Warren, Jr.

*Can. J. Fish. Aquat. Sci.* 57: 1508-1514 (2000)

# Community Ecology, Land-use, & Environment:

## Additional Ongoing Studies:

### ➤ Environmental Variability

- Drought & recovery of fish & crayfish (north Mississippi) & mussels (Alabama)
- Spatial & temporal variation in fish assemblages of upper Coastal Plain streams (north Mississippi)
- In-stream wood, stream incisement, & fishes (north Mississippi)



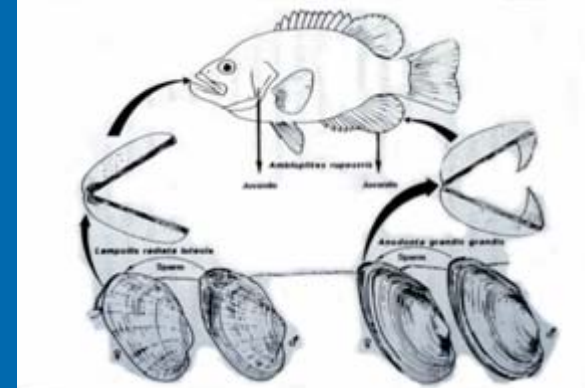


# Life History, Distribution, Autecology

## Life History of Freshwater Mussels

### ➤ Host-fishes

- Hosts for 17 species
- 6 federally listed, 5 AFS listed
- Host attraction strategies 16 species



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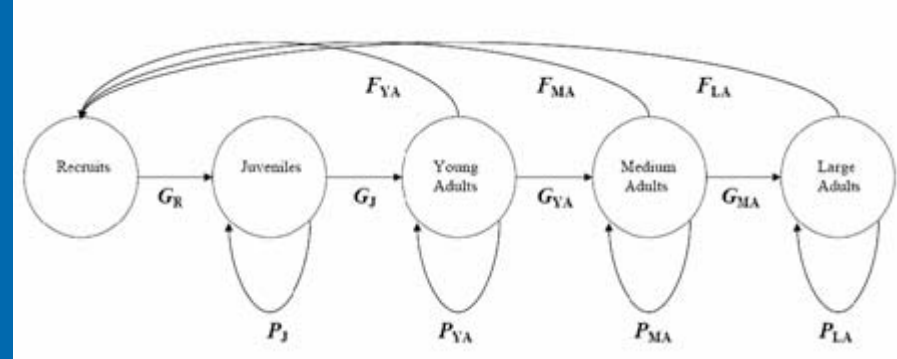


*Leptodea fragilis*

11,873,663

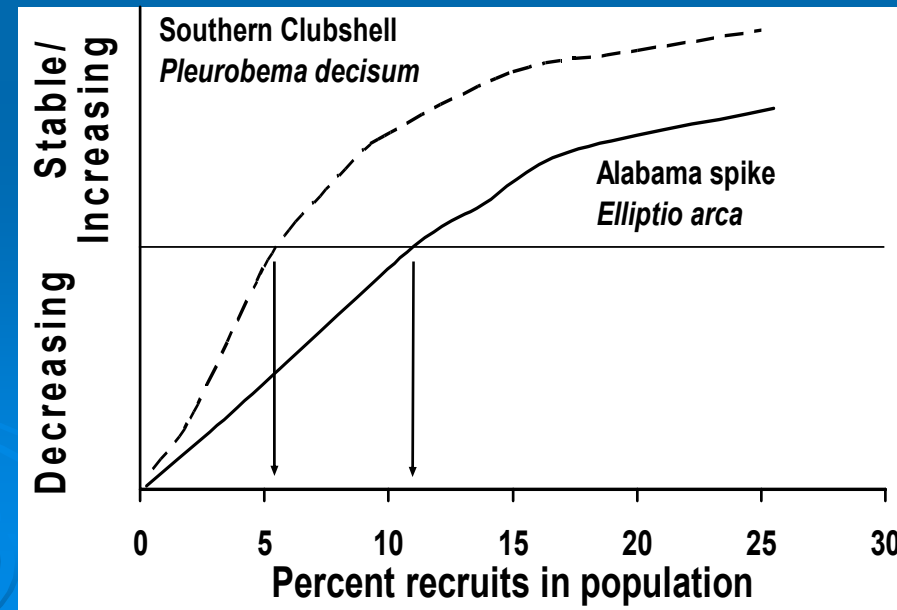
• Crayfish-k

# Population Biology: Dynamics, Demographics, Growth Rates



## Freshwater Mussel Population Dynamics

- Most comprehensive, long-term effort
- Sipsy, Tallahatchie & Buttahatchee rivers
- Annual censuses 1999-2003
- What population measurements are needed to assess management effects?
- What is typical recruitment?
- What is normal mortality?
- Cooperators/supporters
  - Weyerhaeuser
  - National Fish & Wildlife Foundation
  - Mississippi Museum Natural History
  - USFWS
  - Alabama Geological Survey
  - University of Alabama
  - Riverside Hunting Club





# Aquatic-Terrestrial Linkages

## Channel catfish dispersal of swamp privet seeds

- On-going, 2002-present
- Channel catfish
  - Defecated seeds germinate
  - Are fruits beneficial to catfish?
  - How variable is nutrient content over time and space?
  - How often is swamp privet fruit available to catfish?
- Other swamp privet seed dispersers:
  - Cedar waxwings
  - Wood ducks ?
  - Passive dispersal (floating, suspended)



Gastric lavage



Swamp Privet

# **Team Leadership, Recognition & Productivity**

## **1997-2003**

### **Leadership:**

**El Grupo Ceruleo**

**Cerulean Warbler Working Technical Group**

**American Fisheries Society**

**American Society Ichthyologists & Herpetologists**

**Southeastern Fishes Council**

**Partners in Flight**

**Associate Editor, TAFS, NAJFM**

**Science Editor, Fisheries**

**National Awards: 8**

**Peer-reviewed publications: 51**

**Other publications: 48**

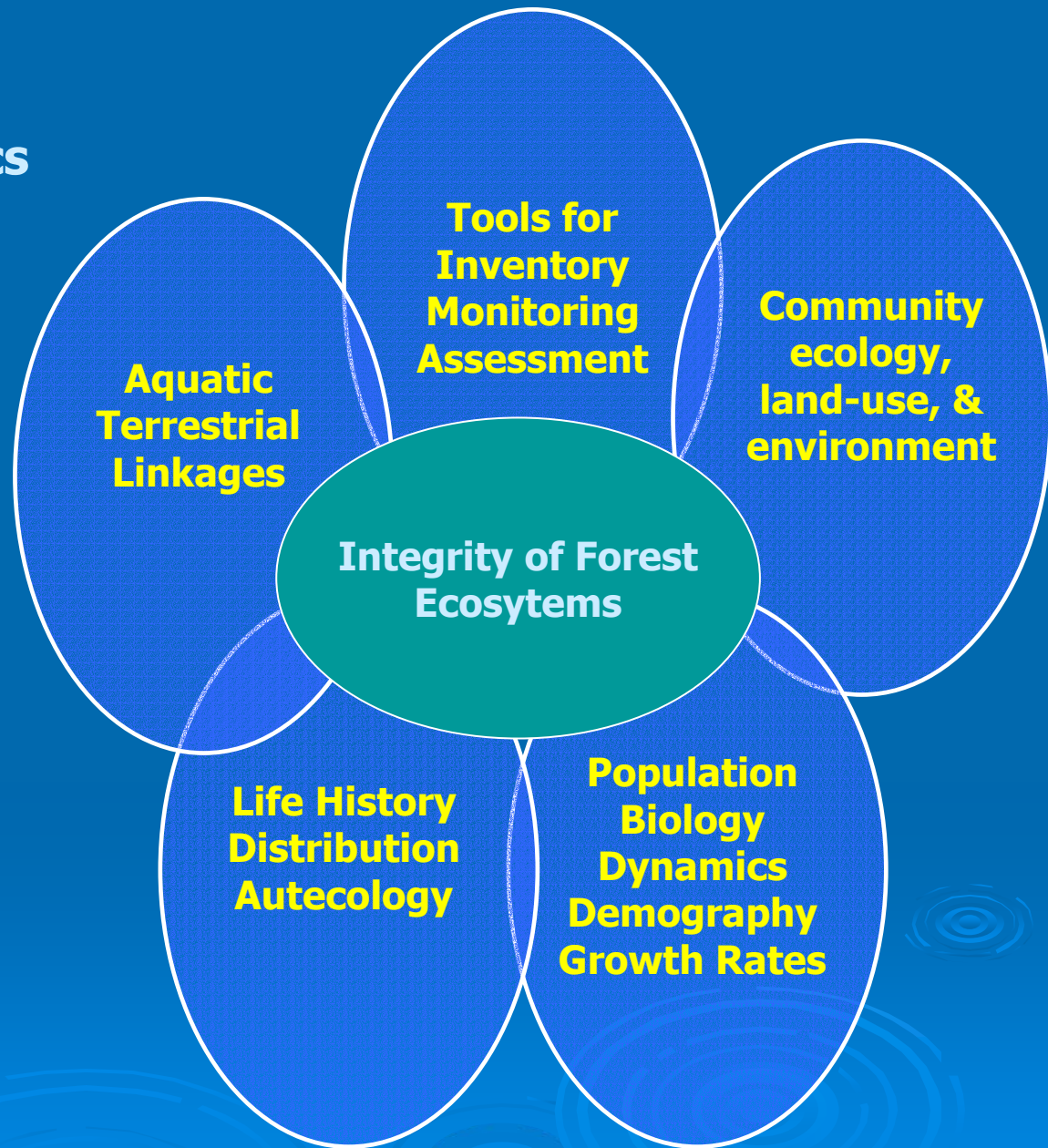
**In press publications: 42**

**Outside CBHR dollars: \$922,000**



# Future Directions

- Mussel population dynamics
- Anadromous fishes
- Crayfish ecology
- Capitalize on Ms NF survey
- Seek opportunities
- What do you think?



**Capabilities**



Questions?

